CLAIMS

1. A method for converting gaseous hydrocarbons to liquid hydrocarbons in which the Fischer-Tropsch process is employed, said process producing liquid hydrocarbons and a waste gas comprising at least hydrogen, carbon monoxide, carbon dioxide and hydrocarbons with a maximum of 6 carbon atoms, characterized in that the waste gas is subjected to a separation method producing:

- at least one gas stream comprising methane and for which the recovery rate of hydrogen and carbon monoxide is at least 60%,
- at least one gas stream for which the carbon dioxide recovery rate is at least 40%, and
- at least one supplementary gas stream mainly comprising hydrocarbons with at least 2 carbon atoms.

2. The method as claimed in claim 1, characterized in that the separation method makes use of a PSA separation unit.

3. The method as claimed in claim 2, characterized in that the PSA separation unit further produces at least one gas stream mainly comprising hydrogen.

4. The method as claimed in claim 2, characterized in that the waste gas separation method makes use of a second PSA separation unit producing at least one gas stream mainly comprising hydrogen.

5. The method as claimed in one of the preceding claims, characterized in that the waste gas comprises at least nitrogen and in that the waste gas separation method produces at least one gas stream comprising nitrogen.

6. The method as claimed in one of claims 1 to 4, characterized in that each adsorber of the PSA separation unit is composed of at least three adsorbent beds:

- the first bed being composed of alumina,
- the second bed being composed of a silica gel, and
- the third bed being composed of at least one adsorbent selected from either zeolites or carbon molecular sieves, with average pore sizes between 3.4 and 5 Å and preferably between 3.7 and 4.4 Å, or a titanium-silicate with average pore sizes between 3.4 and 5 Å, and preferably between 3.7 and 4.4 Å.

7. The method as claimed in claim 6, characterized in that the order of the three adsorbent beds is the following, in the waste gas flow direction in the adsorber: first bed, then second bed, then third bed.

8. The method as claimed in claims 3 and 6, characterized in that each adsorber of the PSA separation unit comprises a fourth adsorbent bed in the waste gas flow direction in the adsorber selected from a zeolite or an activated charcoal if the third bed is a carbon molecular sieve.

9. The method as claimed in claim 4, characterized in that the adsorber of the second PSA separation unit producing at least one gas stream relatively pure in hydrogen is composed of an adsorbent bed comprising at least one activated charcoal.

10. The method as claimed in claims 5 and 6, characterized in that each adsorber comprises a fourth or fifth bed comprising at least one titanium-silicate or one zeolite.

11. The method as claimed in one of the preceding claims, characterized in that, downstream of the waste gas treatment, the gas stream from the separation method, comprising methane and for which the recovery rate of hydrogen and carbon monoxide is at least 60%, is treated by a cryogenic unit in order to produce:

- at least one stream essentially comprising hydrogen and carbon monoxide, and
- at least one stream mainly comprising methane.

12. The method as claimed in one of claims 1 to 10, characterized in that, downstream of the waste gas treatment, the gas stream from the separation method, comprising methane and for which the recovery rate of hydrogen and carbon monoxide is at least 60%, is treated by a cryogenic unit in order to produce:

- at least one stream essentially comprising hydrogen,
- at least one stream mainly comprising carbon monoxide, and
- at least one steam essentially comprising methane.

13. The method as claimed in one of claims 1 to 10, characterized in that, downstream of the waste gas treatment, the gas stream from the separation method, comprising methane and for which the recovery rate of hydrogen and carbon monoxide is at least 60%, is treated by a downstream PSA method in order to produce:

- at least one stream essentially comprising hydrogen, and
- at least one stream mainly comprising carbon monoxide and methane.

14. The method as claimed in one of the preceding claims, characterized in that at least a portion of the gas stream from the waste gas separation method, comprising methane and for which the recovery rate of hydrogen and carbon monoxide is at least 60%, is used as reagent gas in a method for synthesizing a gas comprising H_2 and CO.

15. The method as claimed in one of the preceding claims, characterized in that at least a portion of the gas stream from the waste gas separation method, comprising methane and for which the recovery rate of hydrogen and carbon monoxide is at least 60%, is used as reagent gas in the Fischer-Tropsch process.

16. The method as claimed in one of the preceding claims, characterized in that at least a portion of the gas stream from the waste gas separation method, mainly comprising hydrocarbons with at least 2 carbon atoms, is used as fuel.

17. The method as claimed in one of the preceding claims, characterized in that at least a portion of the gas stream from the waste gas separation method, mainly comprising hydrocarbons with at least 2 carbon atoms, is used as reagent gas in the generation of synthesis gas.

18. The method as claimed in one of claims 3, 4, 12 and 13, characterized in that at least a portion of the gas stream from the waste gas separation method, mainly comprising hydrogen, is used for hydrocracking processes.

19. The method as claimed in one of claims 1 to 13, characterized in that at least a portion of the gas stream from the waste gas separation method, mainly comprising carbon dioxide, is used as reagent gas in a method for synthesizing gas comprising H_2 and CO.